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ABSTRACT

With heavy emphasis on the application of the scientific approach to research in library science, this proposal for an introductory textbook presents an overview of the current status of investigations in librarianship and discusses strengths and weaknesses of existing guides. A conclusion is reached that available guidebooks all fall short of meeting the pressing need for a modern, graduate-level research text in library science. The document outlines in detail content of a proposed textbook which the authors feel would aid students in the identification of productive areas for research or problems in need of investigation, create an interest in and an appreciation of research in general, and stimulate students' interest and ability in questioning existing assumptions in library science. An outline of twelve chapters emphasizes that the proposed textbook will aid students in the development of research hypotheses; help them obtain insights into the appropriate procedures for obtaining answers to various problems in each significant mode of research; and provide information to the student on how to collect, analyze, and evaluate quantitative data rigorously in accord with the research question posed in an investigation. (Author)

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THE SCIENTIFIC INVESTIGATION OF LIBRARY PROBLEMS

A Proposal for an Introductory Textbook Devoted to the Conduct and Evaluation of Library Science Research

by

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October 1972

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A B S T R A C T

With heavy emphasis on the application of the scientific approach to research in library science, this proposal for an introductory textbook presents an overview of the current status of investigations in librarianship and discusses strengths and weaknesses of existing guides. A conclusion is reached that available guidebooks all fall short of meeting the pressing need for a modern, graduate-level research text in library science for one or several reasons, including: (1) a failure to provide a complete presentation of the research process; (2) inadequate attention to quantitative aspects of data collection; (3) insufficient emphasis upon the utilization of theory and scientific rigor; (4) ill-informed use and explanation of descriptive and inferrential statistical methods; and (5) lack of a balanced proportion among problems of design, measurement, and analysis. The document outlines in detail content of a proposed textbook which the authors feel would aid students in the identification of productive areas for research or problems in need of investigation, (2) create an interest in and an appreciation of research in general, and (3) stimulate students' interest and ability in questioning existing assumptions in library science. An outline of twelve chapters emphasizes that the proposed textbook will aid students in the development of research hypotheses; help them obtain insights into the appropriate procedures for obtaining answers to various problems in each significant mode of research; and provide information to the student on how to collect, analyze, and evaluate quantitative data rigorously in accord with the research question posed in an investigation.

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A PROPOSAL FOR A TEXTBOOK

I. RESEARCH AND THE LIBRARY PROFESSION

While progress in a number of areas of library science has long been impeded because of research deficiencies, enough rigorous, scientifically-oriented, and reliable investigations have been conducted within the library profession to emphasize the usefulness of research as a tool for solving many of librarianship's theoretical and practical problems at all levels of difficulty. Also comforting to librarians, particularly those directly involved in library education, is the recognition that in a technologically-dominated, rapidly-changing era — which is characterized by massive accumulations of knowledge, proliferations of information processing and disseminating techniques, demands for literacy on a world-wide basis, needs for global ecological balance, and pressures for genuine social equality among individuals and groups — formal research can greatly facilitate the development of solutions to many of our social, as well as our professional, problems.

To ensure that libraries remain viable social institutions in any locale and in whatever settings they might be found and that collections of materials and programs of service are relevant to the information and communication needs of users who depend upon and support these social instutitions, librarians must explore -- often with huge jumps rather than small steps -- new approaches and novel methods which require not only imagination and originality but sound decisions rooted in objectively collected and carefully analyzed data.

Changes within librarianship which appear to be imminent and necessary for the advancement of knowledge in the field require from the profession's own leadership the best recourses and solutions that research can provide. Librarianship is now achieving a maturity that requires astute and knowledgeable application of the scientific approach to investigation. Many members of the library profession realize today that the best answers to urgent library issues and questions should originate from "within ranks" as a result of research expertise among librarians. Indeed, a distinguishing criterion of any profession is the ability to develop a structure of theoretical knowledge, to generate hypotheses relevant to variables with which the profession grapples, and to conduct both basic and applied research in a scientific manner. As librarianship develops a system of theoretical and methodological knowledge, greater benefits will most probably be realized from its research efforts.

While some librarians have been critical of the insufficiency of research, others have underlined the reluctance of members of the profession to utilize the conclusions and recommendations resulting from completed research. If research is to become of more value to librarianship, the gap between existing valid and reliable data produced by investigations and implementation into library practices must be narrowed. These gaps occur as a result of a combination of factors: differences in conceptualizations, structure, and functions of librarianship; lack of an appreciation for quantified data; differences among those variables perceived to be relevant by various librarians; and unfamiliarity with statistical techniques. On the other hand, there have also been innovations in libraries

that have occurred without supporting evidence from research. But the advocate and supporter of research claims that innovations have occurred despite such proof and that changes have not always been for the better or necessarily in the appropriate direction.

Unfortunately, the question of research in librarianship has been similar to that of the topic of weather among the general populace: more talk than doing. Conversely, while librarians have not hesitated to give lip service to rigorous studies and to proclaim the desirability of research, relatively few have been moved to action. Apparently, librarians have traditionally placed a far greater emphasis on administrative and practical skills; consequently, scholarly investigations of both a theoretical and a practical nature have too often been neglected. Practicing librarians in the "real world" of librarianship have not hesitated to promote library development and services; on the other hand, those who operate our libraries have often been neglectful of examining many of the assumptions which underlie the development of collections and programs of service.

The literature of library science is replete with examples of the inadequacies of library research. While it is not the purpose of this proposal further to document that deficiency, a few comments from articles and monographs on the topic are in order here as a partial justification for an improved textbook devoted to research methods in library science.

II. STATEMENTS FROM THE LITERATURE: SIGNIFICANCE OF THE PROBLEM

Harold Lancour, Dean of the Graduate School of Library and Information Sciences at the University of Pittsburg, has said:

> It is only through such study [scientific research] that librarianship can move out of the condition where it is almost exclusively dependent on knowledge acquired in actual experience by trial and error but not yet systematized into scientific laws and theories. The goal of research is the formulation of a scientific law by testing, verifying, and confirming a generalization often enough and in sufficient diverse circumstances that one can be confident that it is correct. Its value is that it allows for prediction -- that a given thing will happen under certain circumstances. (1)

According to Voigt and White,

> ...it is apparent that systematic advancement of library science through research is still in the beginning stage. A key word is "systematic." Research has tended to be unsystematic, spotty, precariously supported, and much of it has been organized to serve the needs of decision making. The predominance of applied research is related to lack of financial support. Progress in fundamental research can be accelerated through organizing and supporting work on a scale broad enough to disengage it from the immediate needs and interests of practicing scholars, or public officials and practicing librarians. (2)

Practitioners in the field have been quite vocal in expressing dissatisfaction with research data on which important decisions have often been based. A frequently appearing criticism of research efforts has been that too large a portion of the studies undertaken by library school students working for advanced degrees at educational institutions has been merely descriptive or bibliographical rather than contributing to an understanding of immediate or basic problems. The following comment by Robert Muller might help explain that frequent complaint:

> ...since the demand for graduates from advanced programs was so much greater than the supply, employing institutions

> did not concern themselves with the question of relevance of the advanced programsto the actual library scene as long as a prestigious institution of higher learning had placed its stamp of approval on a given candidate who was being considered for employment as a library manager or a professor. (3)

Andrew Eaton, Director of Libraries at Washington University, has further summarized deficiencies of completed research in librarianship: "Common defects are unsatisfactory sampling techniques, under-conceptualized study designs, primitive measuring instruments, and studies conducted on too small a scale to permit generalizations. (4)

Howard Winger, Dean of the Graduate Library School of the University of Chicago, has written:

> The broadening range of the library schools' engagement in research involves both questions and methods. Concern is growing in American librarianship for the policy toward users. Who is the appropriate client? In the university, for example, is it the student or professor? Investigations of the most effective way to serve the needs of an assumed client are taking a new turn. Operations research, with the use of mathematical models to predict the success of a library operation, provides new opportunities for creative research. These developments seem to me to extend the range of research in librarianship, for I can think of no previous areas of investigation that are made obsolete by new demands. In respect to the client, it would seem to me that historical studies bear on this great question of policy and that social surveys and studies of communication behavior ought to be re-emphasized. (5)

If the preceding statements accurately reflect some of the past library research, an underlying cause for weaknesses would appear to be research incompetencies, such as deficiencies in the educational and background preparation of those who have undertaken research.

Among the reasons advanced for the lag in both the quality and quantity of library research is that library education has not

adequately instructed students in the methodologies of research, nor has it been completely successful in encouraging future librarians to cultivate a productively critical attitude toward their chosen profession. Those librarians who lacked a thorough understanding or appreciation of research methods have encountered difficulties in conducting research when a structure of theory or a "nomological net" is in a state of childhood, if not infancy. Moreover, social research, including investigations of many library problems, is frequently difficult and complex. The investigator in library-related research has often discovered the investigative process to be a trying experience because of complexities in recognizing pertinent variables and in describing relationships existing between them.

Thus, the task of connecting relevant properties or characteristics of librarianship has been made more difficult by weaknesses in an underdeveloped theoretical web of librarianship. Indeed, both theory and practice are important. Theory is related to the asking of pertinent questions, to research methodology, and to the interpretations of findings. To conduct research in a theoretical vacuum is often not only an onerous but a wasted effort. Armed with a theory, investigators are more likely to ask pertinent questions; they are more aware of the important variables as well as apparent relationships between them. Questions which can be answered scientifically are more likely to be asked by investigators aware of the theoretical implications of their research. Such questions will most probably be in a form that includes the variables,

and some method of approaching a solution will be implied.

On the basis of relevant theory, investigators are less likely to confuse concepts; they are more inclined toward conceptually-clear questions at a level of abstraction permitted by the theory. Theoretically-oriented investigators can suggest hypotheses that never occur to an individual who does not have a mental "floor plan" laid out. Thus, theory can help guide the importance, form, range, and clarity of the questioning process. Non-theoretical investigators tend to ask questions that are not operationally definable, that are duplicates of similar questions which have been asked and discarded as unimportant, or that have already been answered.

Theory can also indicate appropriate methodology. An awareness of the theoretical implications of a library issue or problem can offer clues to pertinent methods for research and can stipulate what area is to be investigated, how research is to be conducted, and what evidence should be sought and reported. Any and all methods, inculding anecdotal evidence, are open to non-theoretical investigators; however, the person who uses such attestation runs the risk of not being understood or of producing unreliable, invalid, or meaningless results. Hopefully, a textbook such as the one proposed here will contribute to the development of library theory by promoting, and perhaps stimulating, scientific inquiry into significant library problems.

Insofar as the relationship of theory to the interpretation of findings is concerned, those who have conducted library science investigations who have lacked an understanding of theories of

librarianship have not always known if their conclusions have clashed with theory. Investigators who have been more aware or familiar with existing theories, on the other hand, have been prone to re-assess their studies and to pose further hypotheses and other methods of testing. A knowledge of existing theories can provide a scholar-librarian with standards which he can use to weigh the validity of his results, one way or another. Obviously, findings that confirm a theory ought to be more relied upon than otherwise; moreover, what the investigator does next is important. Theory ought to guide subsequent "follow-up" investigations if librarianship is to obtain continuity in its research. Negative or contradictory findings from studies might allow the development of new theories -- and new research possibilities. In the final analysis, it is evident that unless more scientifically-oriented research is conducted by librarians, the profession's body of theory will remain weak.

III. THE PROBLEM NARROWED DOWN AND RESTATED: THE NEED FOR A TEXTBOOK

Available research methods texts and guidebooks all fall short of meeting the pressing need for a modern graduate-level text for one or several of the following reasons:

(1) Failure to provide a complete presentation of the research process, along with insufficient research concepts and insufficient practical examples or actual research experiences.

(2) Inadequate attention to quantitative aspects of data collection.

(3) Ill-informed use and explanation of descriptive and inferential statistical methods.

(4) Weakness in clearly describing logical research designs for various kinds of studies.

(5) Lack of a balanced proportion among problems of design, measurement, and analysis.

(6) Imbalance between theoretical implications and practical aspects of library research.

(7) Inadequate application of available methods of research to specific library problems.

(8) Cursory treatment of the scientific approach to investigations in librarianship.

More positively, a textbook for research methodology in library science should accomplish the following goals:

(1) Aid students in the identification of productive areas for research or problems currently in need of investigation.

(2) Create an interest in and an appreciation of research in general.

(3) Stimulate students' interest and ability in questioning existing assumptions.

In particular, a textbook devoted to scientific research methods of use to librarians should provide guidelines so that the researcher can:

(1) Develop an understanding of specific problems to be investigated as they relate to findings from associated, previously-conducted research.

(2) Recognize the significance of the area of research to be undertaken in terms of its relation to larger problems and relevant theories.

(3) Aid the development of research hypotheses.

(4) Conduct insightful literature searches, both as a scientific obligation and in order to utilize findings from related studies.

(5) Understand the appropriate procedures for obtaining answers to various problems in each basic mode of research: historical (the past), survey (the present), and experimental (the future).

(6) Collect, analyze, and evaluate rigorously qualitative and quantitative data in accord with the research question posed or with the hypothesis formed.

(7) Outline in formal research reports, clearly and simply, the findings and conclusions of an investigation, whether the report consists of narrative, graphical, tabular, or abstract formats.

(8) Relate explicitly the immediate research findings to existing theories as well as to previous studies.

(9) Propound for further research new hypotheses derived from a specific, completed investigation.

IV. RELATED STUDIES: TEXTBOOKS AND GUIDES ALREADY PUBLISHED

Library school faculty members engaged in teaching courses in research methods have been keenly aware for years of the lack of an adequate, introductory research textbook relevant to problems of the library profession and with sufficient information about modern research techniques. Several useful books devoted to the topic of library science research have been published; however, comments

from the literature of librarianship indicate that no single work has yet satisfied that need. While Goldhor's An Introduction to Scientific Research in Librarianship (6) is a valuable start, it has not provided the definitiveness of a textbook for use in teaching graduate-level library science research courses. Hewitt has stated in a review of Goldhor's book:

> This is neither a textbook nor a manual, but an exposition for the beginner on the meaning, goals, and limitations of scientific research in librarianship... While there are some solid guidelines on how to identify a research topic and how to approach the planning and design of a study, the serious student would need to go beyond Goldhor to the more detailed and technical works listed in his bibliography. (7)

In another review of Goldhor's work, Stangl similarly declared:

> This is by no means a handbook to be used by would-be researchers, yet reading Part II the novice might be tempted to try to use it as a handbook. This is particularly true of the section on statistical methods, which discusses and explains some basic statistical techniques. But since treatment is too brief and superficial to serve as a bench guide, this would have been better omitted. More useful would have been a detailed discussion of the nature of statistics and the general need for using them... That only about ten pages out of over 100 are devoted to the treatment of analysis, interpretation, and presentation of data, illustrates the ill-balanced nature of Part II... Planning is treated very well, analysis barely at all. (8)

Childer's review in the Library Journal pointed out that:

> People (and doctoral students) intending to perform controlled research may find it [Goldhor's book] useful as an introduction, but probably not sufficient for knowing how to proceed in an investigation or for developing a personal philosophy of research. (9)

Bundy and Wasserman's Reader in Research Methods for Librarianship (10) is a recent contribution to the subject of library research, but its primary usefulness is as an anthology of supplementary readings. The work concentrates on research methods in other areas and disciplines, with research parallels gleaned for the most part

from the behavioral sciences. Consequently, it is not a primary text. As Levis stated in his RQ review of the anthology:

> Few of the selections deal directly with library research and the content itself is nowhere near the beginner's level. This is high calibre material which will be of interest mainly to the library school staff and the more theoretical of our compatriots. (11)

A research methods book published in the 1930's, Investigating Library Problems by Douglas Waples (12), is out of print. Waples, who was one of the University of Chicago Graduate Library School's leaders in promoting research, produced a milestone insofar as research in librarianship is concerned; however, it was only a beginning. In reviewing Waples' book Purdy wrote:

> Investigating Library Problems is our first inspector's manual. It is a manual of the barest outline type, however -- somewhat in the nature of a guide to the literature of research in librarianship... It represents a first step, and an important one if for no other reason than that it is the first. Its somewhat vague groping, which will irritate many librarians, is not primarily a result of Professor Waples' charming talent for writing completely around a point without quite touching it, but rather of the complex nature of the subject treated. (13)

Buckingham further declared about Waples' book:

> This book, then is a chal lenge to librarians to justify their institution and to appraise its service upon more valid bases than they have hitherto employed; to seek those bases in the social field rather than in the institution itself; and to define, interpret, and defend such bases by employing research methods already known to be effective for similar purposes. (14)

In addition to the three works discussed here, several other contributions to the area of library research have been published; however, they cover particular methods such as community surveys, library surveys, and historical investigations, rather than being all-inclusive. There are, of course, numerous research methods textbooks for specific areas of study such as education, communication,

sociology, etc., and their weaknesses insofar as librarianship is concerned have already been outlined in this proposal.

V. OUTLINE AND DISCUSSION OF A PROPOSED TEXTBOOK

A tentative outline for a proposed textbook, The Scientific Investigation of Library Problems, is provided below. The authors of this proposal plan to collaborate in the preparation of each chapter of the work.

PART I: APPROACHING LIBRARY PROBLEMS SCIENTIFICALLY

1. Librarianship and Science
2. Scientific Problem-Solving and the Research Process
3. Writing a Proposal for Scientific Research

PART II: METHODOLOGY FOR RESEARCH IN LIBRARIANSHIP

4. Experimental Research: Design and Measurement
5. The Community Survey and the Library Survey
6. Topical Survey Research: Questionnaires and Interviews
7. Descriptive Research: Historical, Bibliographical, and the Case Study
8. Additional Research Methods: Content Analysis, Exploratory Studies, Evaluative Studies, Work Simplification, Operations Research, and Systems Analysis
9. Large-Scale Research, Team Research, and the Computer as an Aid to Research

PART III: EVALUATION AND INTERPRETATION OF DATA

10. Analysis of Quantified Data: Utilization of Descriptive and Inferential Statistical Techniques
11. Arriving at Conclusions and Recognizing Implications
12. Writing a Research Report: Narrative, Graphical, Tabular and Abstract Formats of Presentation

GLOSSARY

SELECTED BIBLIOGRAPHY

APPENDIX

In order to explicate the contents of the proposed textbook, a more detailed description of each chapter is provided in sections of this proposal which follow. Each part of the proposed work will be discussed in accord with its place in the sequence of chapters as outlined on page thirteen.

PART I. APPROACHING LIBRARY PROBLEMS SCIENTIFICALLY

The most productive avenue to acquiring knowledge has been through the scientific approach. Within the library profession the impact of scientific methodology has been attested by the widely adopted change from Dewey's "library economy" to "library science" — a title which is more inclusive and which was apparently adopted to obtain better status for library schools within academic communities. The chief theme of Part I of the proposed book will be that science is a system of knowledge based on observation, accurate thinking, and experimentation; that science is a progressive development of conceptual schemes that have been carefully tested; and that science has among its goals the prediction, control, and interpretation of events. Implicit in these statements is the premise that all science is preferably based upon the results of experimentation; consequently, the experimental method will be given emphasis. Examples of realistic library experiments which have been completed and/or proposed will be presented.

As the technical terminology or "jargon" of scientific methodology is important to the student of research methods, the following concepts listed on the following page will be among those defined, explained, and exemplified in the text, besides being summarized in a glossary.

Abstraction
Applied research
Assumption
Basic research
Behavioral science
Category
Causality
Comparison
Concept
Confirmation
Construct
Contingency
Criterion
Data
Deduction
Dependent variable
Determinism
Discipline
Dynamics
Empiricism
Explicate
Exponent
Extraneous variable
Evaluation
Fact
Field study
Generalization
Goal
Heterogeneity
Heuristic
Homogeneity
Hypothesis
Implication
Independent variable
Index
Induction
Inference
Interpretation
Intervening variable
Laboratory
Measurement
Methodology
Model
Necessary condition
Null hypothesis
Objectivity
Observation
Operational definition
Paradigm
Parameter
Parsimony
Permutation
Prediction
Premise
Probability
Problem solving
Pure research
Qualitative data
Quantitative data
Randomization
Reality system
Reference
Reliability
Reproduction
Rigor
Scales of measurement
Science
Semantics
Serendipity
Simulation
Social psychology
Specimen
Statement of fact
Stereotype
Subjective
Sufficient condition
Symbolization
Syntax
Theoretical system
Theory
Truth
Validity
Verification

While the above listed terms and concepts are arranged in alphabetical order, their appearance in Part I of the textbook will be according to their logical place in the narrative of each chapter.

Chapter 1. Librarianship and Science

In the first chapter emphasis will be placed on the following aspects of science:

(1) Science deals with an important store of knowledge.

(2) Science creatively develops a theory of increasing unification and accuracy for the improvement of its practices.

(3) Science tests its theories, hypotheses, and conclusions conscien-

tiously and regularly.

(4) Science uses measurement whenever possible and develops additional methods to quantify important qualities.

(5) Science systematically transforms its practices into theory.

(6) Science recognizes the potential importance of its investigations and findings for the general welfare, helps apply its findings to practices and devices, and accomplishes its studies economically and efficiently.

(7) Science keeps up-to-date in its use of the latest and best equipment and methods.

(8) Science continuously improves the precision and sophistication of its mathematical operations.

(9) Science develops a consistent, non-emotional, technical vocabulary.

(10) Science demonstrates impartiality and detachment with truth as its criterion of judgment.

Research techniques to be emphasized in this textbook will include those methodologies deemed to be most reliable and beneficial to librarianship. The scientific approach will be consistently applied to examples of studies in librarianship. One of the objectives of science is the obtaining of satisfactory answers to <u>how</u> questions (How do phenomena come to appear as they do, and how do they undergo the process of change?). Besides clarifying the importance and need for answers to the how questions of librarianship, the textbook will underscore the importance of answering <u>what</u> and <u>who</u> questions. That is, before librarianship can answer the how questions, it must know what the structure of library science is, with what speed these structures change, and who can benefit

from libraries, and in what manner. Chapter 1 will also indicate that a librarian-scientist -- to be able to explain the phenomenon of the collection, storage, and retrieval of information in libraries -- must understand the process of communication and also have an accurate picture of pertinent variables and their relationships. Thus, the research textbook proposed here will focus attention on investigations related to the characteristics or "properties" of librarianship, as well as their relations. Statements of relationship explain how one factor functions with respect to other factors.

An outline of a graduate-level course taught at the Indiana University Graduate Library School entitled "Introduction to Research in Library Science" is included in the appendix of this proposal as an indicator of the general scope of the proposed textbook.

Chapter 2. Scientific Problem-Solving and the Research Process

After the basic principles of science and its methods have been presented and related to librarianship in Chapter 1, an examination of how those principles can be put into practice will be made in Chapter 2. The scientific method as a technique of problem solving for librarianship will be emphasized. This will be accomplished by a thorough discussion of a series of seven steps for scientific problem-solving. These steps are outlined below:

(1) Describe the problem and critically review the relevant literature.

(2) Gather previous facts by collecting thoroughly the pertinent data from former field or laboratory investigations and, if applicable, any ex post facto studies.

(3) After careful examination of the collected information, refine

the problem, pose specific hypotheses or questions, and anticipate a solution.

(4) Structure and conduct experiments or studies in order to test the most feasible hypotheses in relation to the most crucial questions.

(5) Evaluate data obtained and evidence accumulated and draw conclusions.

(6) Utilize results of the research to predict new effects for the preparation of new hypotheses.

(7) Record findings in a research report that communicates newly-acquired insights to those persons interested in the problem.

Chapter 2 will emphasize the use of the research process for the careful collection of data that pertains to particular problems presented. The fact that research is concerned with the past, present, and future will be demonstrated, so that data about past events is collected to clarify present problems in order to derive a better solution for the future.

Chapter 3. Writing a Proposal for Scientific Research

One of the chief obstacles facing beginners in conducting research (especially graduate students working for advanced degrees in library science) is that of writing a research proposal. Most academic departments in colleges and universities require the student to prepare a formal, written statement which outlines what the investigator plans to do in a program of research. The proposal is thus an instrument which the investigator uses to convey his intentions to others; it reveals the character of the specific research problem, the context or theory out of which the problem arises, the significance of the problem to the general area of inquiry, related studies, the methodology to be applied in obtaining answers to the problem, possible techniques which will be used

in analyzing collected data, and the limitations of the proposed research. Within academic institutions, a student's program of research is usually accepted or rejected by his department or school on the basis of how well the research program has been tentatively planned and explained in the proposal. If a proposal contains weaknesses or inadequacies, the student might be required to re-think his problem, to make revisions in his plans, and to re-state his intentions. If the proposed research project is deemed to be of little value (not worthy of being conducted), the student might be required to propose yet another study.

The research proposal is not only a required statement of student intent in academic institutions; it is frequently prepared and submitted by library practitioners in order to obtain financial assistance from agencies or other sources responsible for administering funds for research purposes. The proposal can also be used to convey to library administrators the intentions of an investigator (perhaps a member of the library's staff), who wishes to conduct a program of research that might be elaborate, costly, or time-consuming and which might require the cooperation of several departments within a library.

In order to prepare the student for the above stated possibilities, Chapter 3 will provide detailed guidance in the preparation of proposals. A sample proposal will be offered as a model; each step in the process of planning and writing the proposal will be outlined and carefully analyzed. Such an outline suggested for use by students is provided in the appendix of this document.

P A R T I I . METHODOLOGY FOR RESEARCH IN LIBRARIANSHIP

Research is used especially to help solve problems of significance: (1) Preliminary or exploratory studies may be used to delineate the exact character of the problem; (2) Research can be used to determine what alternative solutions to problems are available and which choice would seem most appropriate; and (3) Research can be used to determine the amount and degree of success, as well as those modifications of solutions which appear desirable. To aid in the clarification and solution of problems, the second part of the proposed textbook will deal with the topic of design and measurement; the broad types of research (descriptive and historical, survey, and experimental); and specific research techniques. Within three broad classifications of research, the following terms and concepts will be defined, elaborated, and exemplified:

Action research
Attitude measurement
Attitude scales
Case study
Community survey
Comparison
Content analysis
Crucial experiment
Demonstration
Descriptive statistics
Direct observation
Dissertation
Ex post facto experiment
Experimentation
Exploratory study
Evaluation
Field study
Historical research
Interview
Item analysis
Laboratory
Library survey
Literature search
Measurement
Multiple-choice item
Nominal scale
Obtrusive measures
Open-ended question
Opinion
Ordinal scale
Outline
Personality inventory
Post-test
Pre-test
Problem solving
Programmed instruction
Psychometrics
Public opinion poll
Questionnaire
Random sample
Randomization
Ratio scale
Research design
Research team
Sampling
Scales of measurement
Scaling
Set theory
Social sciences
Specifications
Standardized text
Statement of fact
Statistical inference
Statistical significance
Stratified sample
Survey
Systems analysis
Trend analysis
Unobtrusive measures

Chapter 4. Experimental Research: Design and Measurement

This chapter will be devoted to the systematic and logical study of principles of design and measurement which should guide scientific investigations. Research designs have been formalized for various kinds of experiments, but any worthwhile research project should be designed carefully to include relevant sources, to produce a valid study, and to obtain dependable results. The advantages of utilizing measurement in research include the following, which will be pointed out in the textbook:

(1) Quantification (3) Objectivity

(2) Precision (4) Statistical calculations.

Scientific measurement will be defined and discussed in this chapter, along with the four types of scales for the measurement of an operational variable: nominal, ordinal, interval, and ratio. These scales will further be illustrated with examples applicable to problems of library science research. Sampling in studies of characteristics and in studies of relationships will also be discussed in detail.

The "classical" experimental design will also be outlined in Chapter 4, and an example from library research will be provided of the experimental method. The series of steps to be followed in the four-cell experimental design will be explained according to the following outline:

(1) Investigator draws a random sample from a specified population.

(2) Random sample is then broken down, again randomly, into a control group and an experimental group.

(3) Each group is pre-tested with respect to the pertinent dependent variable (the basic question involved).

(4) Experimental group is then subjected to the "treatment," which may or may not influence members of the group.

(5) Both the experimental and the control group is then subjected to

statistical analysis to determine if a statistically significant difference is apparent between the two groups' scores (measures).

(6) Results of the statistical treatment of the data collected from the control and experimental groups are used as evidence to either support or to reject the hypothesis or hypotheses.

Approximations of the "classical experiment" or the four-cell experiment will further be presented in the textbook. Research in which "before" cells are missing but in which there are two or more "after" cells will be discussed, and examples provided. Such studies are frequently referred to as "correlational" investigations. As an alternative to the experimental approach, the clinical method will be discussed for application to projects which cannot manipulate or exercise control over sociological factors relevant to individual or group behavior. The clinical method involves taking from the two "after" cells those persons who show or possess a particular effect, followed by an attempt to ascertain the treatment to which they have been subjected. Also along these quasi-experimental lines, hypothesis-generating research designs will be treated.

Chapter 5. The Community Survey and the Library Survey

The uses of the community survey as a source for information for locating and planning new library buildings, as a guide to formulating book selection policies, and as a guide to planning programs of library services and activities will be emphasized in Chapter 5, and examples of some of the more rigorously conducted surveys will be cited and discussed. A library exists to serve its patrons' information needs, and the community survey has been used widely to determine objectively

the needs of local users, potential users, and non-users. Because a community survey can be applied to study the needs of library patrons within any type of community, general or special, the different types and uses of surveys will be covered in accord with these guiding principles:

(1) Surveys should be primarily for information, rather than for action.

(2) Surveys can cover an entire community or a sampling of it.

(3) Surveys can be designed to canvass a particular need.

(4) Surveys can be conducted by both volunteers and professional workers.

The conduct of library surveys, through which data are gathered according to a more or less definite plan and schedule and is presented in tabular, statistical, graphical, or summary form, will also be discussed in this chapter.

Chapter 6. Topical Survey Research: Questionnaires and Interviews

Survey research techniques will often be used to investigate large and small populations or groups by selecting and examining samples chosen from the totality to discover the relative incidence, distribution, and relation of various factors. Topical survey research will be differentiated from status, community, and library surveys. The procedures and methods of survey research which will be detailed here have been developed by psychologists, sociologists, anthropologists, economists, political scientists, statisticians, and private public opinion polling services. Survey research is one of the most commonly-used research techniques of the social sciences; its uses in library science research are numerous and often of considerable benefit to the library investigator.

The rigorous scientific stamp which the developers of survey research have implanted on this technique will be emphasized in Chapter 6, and students will be encouraged to follow certain carefully-outlined and tested procedures. Since the probability sample is highly important in survey research, samples selected randomly will be discussed at length as a method of determining the number of respondents needed in an investigation, as a guide to estimating errors which result from interviewing a sample of subjects or events instead of interviewing all of them, and as a technique for determining the degree of confidence that can be placed in population parameters generalized from small units of a total group. Because random samples can be used to obtain information which would normally be secured from a census or a complete enumeration, survey research can frequently save money, and, if conducted scientifically, can produce high degrees of accuracy. Stratified sampling, which divides populations into homogeneous subparts or strata, will be discussed also as a method for reducing variation in the population (for obtaining representativeness).

Chapter 7. Descriptive Research: Historical, Bibliographical, and the Case Study

Among the descriptive investigative procedures -- most of which have been put into use in research in librarianship -- historical methods will be considered first. Three major phases of this method will be discussed:

(1) Collection of data, including analyses of documents, primary and secondary sources of information, literature searching, oral history, and information gathering and recording methods.

(2) Evaluation of the collected data, including external and internal criticism of documents.

(3) Interpretation of the collected facts and information in a

narrative report, including the tasks of structuring, composing, and explaining.

Various information and data sources for historical research in librarianship will be covered in this chapter, including: state and federal legislative acts, laws, and charters; annual reports of libraries; minutes of library boards of trustee meetings; printed library catalogs; public relations material; local histories (published and unpublished); newspapers and periodical news items and feature stories; personal papers such as letters, diaries, autobiographies, and other materials; official documents; and remains of library furnishings, equipment, collections, and buildings.

Bibliographical research techniques will also be covered in Chapter 7 as a correlative of the historical method; analytical bibliography, as a means of describing the physical characteristics of books, will also be featured. Problems of bibliographic description, analysis, and enumeration will be identified. The case study method will further be presented as a technique through which significant experiences of persons are recorded and analyzed in order to understand a particular case and to gain insights into a particular situation that might be common to a large group of libraries or to categories of librarians.

Chapter 8. Additional Methods: Exploratory Studies, Evaluative Studies, Content Analysis, Work Simplification, Operations Research, and Systems Analysis

In Chapter 8 a number of additional useful methods of research which are applicable to librarianship will be covered. The exploratory study, including the pilot survey, which is usually a small-scale study designed to produce information for use in a larger study, will be discussed as a

method for obtaining preliminary information about a library problem or topic. The evaluative method, which is often used to determine the relative importance of a library or a library process in terms of some established standard, will be discussed separately. Both qualitative and quantitative evaluation in relation to the effectiveness of regulated conditions in furthering or hindering goals of libraries will be considered.

Content analysis, a method which can be used to describe in an objective, systematic, and quantitative fashion the contents recorded in a medium of communication, will be given careful attention. Developed by journalists and political scientists, the technique of content analysis is adaptable to the scrutiny of the content of various communication media. Systematic observation and theoretical problems must be brought together if librarians are to understand the interplay of media, people, and libraries. Although librarians have long been primarily interested in the book and other printed matter, they must now know more about the effectiveness of these additional types of non-print media in conveying information. In other words, they should know which medium is most effective in conveying which message to which audience. To compare the book as a medium with those of other communication media (films, phonorecords, drawings, slides, microforms, etc.), librarians must have at their disposal studies which allow reliable judgments concerning their relative usefulness. While much of this kind of information can be obtained from other agenices or disciplines, the library is in an excellent laboratory in which some of these questions can be answered. The technique of content analysis can add methodological rigor to the appropriate medium for conveying various types of information.

Work simplification, which is an outgrowth of time-and-motion studies developed in the area of management science, will be discussed and illustrated in Chapter 8. Procedures to simplify many library operations will be scrutinized, with emphasis to be placed on the quantitative aspects of work simplification.

Operations research, or "OR," as it is frequently abbreviated, is a recently developed technique employing the scientific approach to provide administrators with quantitative bases for various operational decisions. This technique places heavy emphasis on advanced mathematical calculations, yet it can conceivably be applied to a number of practical problems in libraries: space and storage problems ("linear programming"), shelf-reading ("inventory models"), circulation ("waiting-line model"), library schedules ("dynamic programming"), computer programs of library operations ("simulation"), and book reserves ("game theory"). Some of the techniques of operations research will be covered in Chapter 8, and examples of completed, successful studies will be given.

Another research method to solve various types of library problems is the over-all technique of systems analysis, which can be applied to the study of a library system as a complete entity and/or to the dynamics of major library functions such as selection, circulation, reference service, or departmentalization. It can also be used to examine important phases of library activities and procedures in order to determine the best sequence of operations. Although systems analysis is often done in a qualitative manner, it can be useful for gaining an understanding of a complex operation or organization and can be useful as a preliminary to more rigorous quantitative investigations in which hypotheses might be put to the test.

Chapter 9. Large-Scale Research, Team Research, and the Computer as a Research Aid.

Consideration will be given to problems related to the conduct of large-scale, organized research, particularly the type that is frequently conducted for, by, or within large institutions. Operations will be examined which are necessary for such institutions as state libraries, library schools, or large libraries and which can uncover new knowledge, develop techniques of application, and communicate the findings of research. Functions relating to large-scale research projects will be discussed as follows: the development of policies; the planning, allocation, and evaluation of research resources; the identification of prospective researchers' interests and capabilities; the obtaining of research support sources; the matching of researchers and resources; and the management of research grants. It is felt that attention should be given to these topics because of the widening spatial scope of research studies, particularly many of those conducted after World War II.

In order to prepare the future library researcher for the demands which might be placed upon him, the textbook will also discuss the accomplishment of interdisciplinary research projects of national and international scope. The appearance of many very large-scale research projects in recent years has brought about the need for more attention to a number of facets of these operations and to team research. One such example on a national scale is the Evaluation Study of ERIC Products and Services (15), which was performed in 1970-72 by the Indiana University Graduate Library School's research center with Dean Bernard M. Fry as principal investigator. Such large projects may be funded by the federal government, as was the case with the ERIC study, or by private foundations. They often require elaborate proposals, complex or intricate

designs for data gathering, the submission of progress reports to funding agencies, and multi-volume summaries or final reports. More often than not, such projects are interdisciplinary and are conducted by a set of experts, who may be specialists separately in knowledge or in procedure. Background studies accomplished under the aegis of national study groups such as the National Advisory Commission on Libraries may also be considered to be examples of team research.

A mechanical innovation which has further had an enormous impact on research has been the electronic digital computer and its supporting devices. The computer has greatly simplified, extended, and speeded up the task of quantitative analysis; its use has stimulated the collection of huge blocks of data, has opened new approaches to the storage and retrieval of information, has enhanced personalized circulation of materials through selective dissemination of information, and has in many cases stimulated the automation of library procedures. Special bibliographic, technical processing, and circulation studies have been performed, for example, with the MARC (Machine Readable Cataloging) data provided by the Library of Congress.

The last section of Chapter 9, which will emphasize the computer as an aid to research, will also discuss programs for use by research workers who plan to utilize automatic computation for quantitative analysis of research data. The discussion will consist of treatment of the following task:

(1) Preparation of data input.

(2) Preparation of program control cards.

(3) Preparation of system cards.

(4) Program operation

In addition, use of "canned" statistical programs, including description and tabulation, multivariate analysis, regression analysis, time series analysis, and variance analysis, will be explained. Because the task of preparing "raw" research data for computer analysis varies according to the program and to the computer language used, emphasis will be placed on those commonalities which are inherent in the preparation of data input, regardless of the program or computer language used. The following terms will be defined and, when possible, illustrated with examples:

Code sheets
Coding
Collator
Data card
Finish card
Job deck
Keypunching
Pause card
Prepunched separator
Program control cards
Reproducer
Sorter
Special characters
Standard data input
System identification card
System load card
System time request card
Tape input
Transgeneration cards
Variable format cards
Variance output formats
Verifier
Zone punches

P A R T I I I. EVALUATION AND INTERPRETATION OF DATA

The effect of any research project often depends upon the investigator's ability to interpret and to evaluate the results of his studies. The proposed textbook will emphasize the flow from analysis to synthesis to evaluation of research undertakings. Part III of the book will be devoted to the analysis and interpretation of collected qualitative and quantitative data, and emphasis will be placed on the latter.

Chapter 10. Analysis of Data: Utilization of Statistical Techniques

As noted earlier in this analysis of each chapter of the textbook, statistical techniques for hypothesis testing and various other quantitative analysis applications such as those relating to the designing and analyzing of opinion surveys will be discussed in several of the previous chapters. Chapter 10 will provide, on the other hand, a much broader treatment of the science of collecting, analyzing, interpreting, and presenting numerical data. In other words, considerable emphasis will be placed on the importance and value of measurement throughout the textbook, and statistical procedures will be discussed and illustrated in this chapter as they apply to various problems of design and analysis, regardless of the specific type of research being conducted. Chapter 10 will allow an in-depth presentation of some of the most useful statistical techniques, and among the topics to be examined and illustrated are the following:

(1) Statistical aspects of planning or designing empirical studies as an aid in the conduct of efficient research projects.

(2) Descriptive and inferential statistical techniques.

(3) Problems of inference from empirical data.

(4) Avoidance of misinterpretations arising from insufficient statistical knowledge.

(5) Errors to which conclusions inferred from random samples are subjected.

(6) Characteristics, purposes, and techniques of measures of central tendency (mode, median, and mean).

(7) Computation of product-moment correlation and the characteristics of positive and negative correlations (reliability and validity).

(8) Comparisons of means and proportions (significance of the difference between means of independent, matched, and paired groups)

(9) Characteristics, purposes, and techniques of measures of dispersion (range, standard deviation, quartile deviation, Kelley's range, and mean deviation).

(10) Use of the Chi-square technique to test chance, null, or equal frequency hypotheses.

Among the numerous technical and mathematical terms of importance to statistical analysis, the following will be defined and illustrated in Chapter 10:

Analysis of variance
Arithmetic mean
Average
Bar graph
Bimodal curve
Bimodal distribution
Chi-square test
Coefficient of reliability
Coefficient of correlation
Confidence level
Coordinates
Decile
Descriptive statistics
Dispersion
Factor analysis
Frequency distribution
Goodness of fit
Grouped data
Histogram
Item analysis
Kurtosis
Leptokurtic
Line graph
Linear correlation
Logarithm
Median
Mode
Nonparametric techniques
Norm
Normal curve
Normal distribution
Null hypothesis
Ogive
Parameter
Parametric techniques
Percentile
Permutation
Population
Probability
Psychometrics
Public opinion poll
Q methodology
Quartile deviation
Random numbers
Random sample
Randomization
Regression curve
Sampling
Scatter diagram
Semi-interquartile range
Skewed distribution
Standard deviation
Standard error
Standard scores
Statistical inference
Statistical significance
Stratified sample
Sum of squares
Symmetrical distribution
Ungrouped data
Variance

SAMPLE STATISTICAL PROBLEMS

Problem 1 Assume that you are conducting research to determine whether public librarians prefer carpeting or rubber tile as floor covering for service areas of libraries. In a sample of 1,200 librarians, you found that 700 preferred carpet and that 500 preferred rubber tile. The question is whether there is a significant difference among the librarians in their preference for carpet. If you assume an equal frequency, you would expect 600 to prefer carpet and 600 to prefer tile, and the hypothesis would be that there is not a statistically significant difference between the number of librarians who prefer carpet and the number of librarians who prefer tile. Can you accept this null hypothesis, or must it be rejected? The significance of the difference can be tested by use of the chi-square, which is symbolized as χ^2 and is computed using the following formula:

$$\chi^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right]$$

f_o = observed frequency

f_e = expected frequency

Problem 2 The data below represent raw scores on a classification exercise completed by thirty (30) students in the Graduate Library School.

31	35	38	39	41	51	52	53	55	57
42	43	45	45	46	60	61	61	64	64
47	48	49	50	50	67	68	70	71	75

Arrange the scores into a frequency distribution with intervals five points wide, beginning with 30-34, and compute a standard deviation for the group of scores.

Problem 3 In a study conducted by economists of the relationship of public librarian's salaries in 1960 to their salaries in 1970, fifteen subjects were selected at random from a population of 97 librarians in a Midwestern city. Part of the study was concerned with the determination of whether a librarian's salary of more than a decade ago would provide a clue to his 1970 income. Incomes for the two years being considered of the selected fifteen librarians are provided below. Compute the coefficient of correlation with the ungrouped data.

Librarian	Income in 1960, in thousands	Income in 1970, in thousands	X^2	Y^2	XY
Adams	6.8	9.6			
Baker	5.4	8.6			
Cole	6.2	10.5			
Doyle	5.7	8.3			
Emery	4.9	9.7			
Franks	7.5	9.8			
Gitto	5.1	12.3			
Hilke	6.0	10.2			
Isler	5.3	8.9			
Jackson	5.6	8.7			
Kolowski	5.0	13.2			
Lee	6.4	15.1			
Moydeau	9.3	16.3			
Neckmann	6.3	10.6			
Olander	5.8	12.0			
Totals					

Formula: $$r_{xy} = \frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{N\Sigma X^2 - (\Sigma X)^2}\ \sqrt{N\Sigma Y^2 - (\Sigma Y)^2}}$$

Problem 4 The significance of the Difference Between Means of Matched Groups: The t test: Calculate the t values between means of the following paired groups, and draw a conclusion as to the significance of the difference.

(1)

Pair	Scores of Experimental Subjects (X)	Scores of Control Subjects (Y)	D	D^2
1	18	14		
2	32	33		
3	22	20		
4	35	27		
5	21	22		
6	33	28		
7	28	25		
8	27	22		

Formula: $$t = \frac{M_1 - M_2}{\sqrt{\frac{N(D^2) - (D)^2}{N^2(N-1)}}}$$ [Standard error of the mean difference]

Problem 5 (Use of standard deviations with the normal curve)

A manufacturer of library furniture has agreed to make fifty chair-desks for the young adult department of a newly-constructed public library. The librarian has required the manufacturer to produce one model designed for the middle 68 per cent of the library's young adult patrons, insofar as size is concerned. The mean height of persons within that category of library users was found to be 68 inches, with a standard deviation of 4 inches. What will be the range of height for the middle 68 per cent of the young adults?

Chapter 11. Arriving at Conclusions and Recognizing Implications.

This chapter will be devoted to an examination of a number of problems which arise in the decisive phase of a research program, some of which are as follows:

(1) Disagreement between investigators about the two broad research fronts: data and interpretation of data.

(2) Viewed retrospectively, the appropriateness of the study's methodology to the problem under investigation.

(3) Problems related to the validity of the measurements (Did instruments measure what they were suppose to measure?).

(4) Errors incurred when ex post facto research data are used as though they were obtained from random observations.

(5) Problems relating to the tendency of investigators to overgeneralize from sample data to a population.

(6) The interpretation of unhypothesized relations which might be discovered as a result of serendipity.

Attention will also be given in Chapter 11 to the separation of data from their interpretation and from the conclusions. While any analysis of collected data usually depends heavily on the kind of hypotheses proposed in a study, the arrival at conclusions and the recognition of implications requires considerable perceptiveness and imagination on the part of the research director. The investigator knows why he undertook the study in the first place; he should have designed the necessary tests to be able to determine whether the hypotheses are supported by the data collected. But the results obtained can sometimes be surprising. As they cannot always be accurately anticipated, to the investigator falls the task of de-

the implications of both expected and unexpected findings. As an obligation to science and to scholarship, those who conduct research must also propose additional studies in the area of their investigation, particularly where significant "loopholes" exist. At the completion of a study, the investigator will frequently know more about his area of study than anyone else; thus, he is in an excellent position to look at the broader aspects of his area of inquiry and to identify the need for additional information and to recommend whether a necessity exists for exact replication of his/her completed studies.

Chapter 12. Writing a Research Report: Narrative, Graphical, Tabular and Abstract Formats of Presentation.

The research report should be written so that the reader can clearly understand the problem investigated, the methodology used, the findings of the investigation, and the conclusions and implications inferred from the study. The writing of a research report requires the skills of clear narrative and lucid explanation if another investigator is to be able to replicate the research reported. A great fault found in some reports of research in librarianship has been a lack of clarity in presentation; the reader has not always been fully informed in certain cases of the specific nature of the problem (theory and hypotheses), of how the research relates to previous studies, of the methodology employed for data collection, of the instruments of measurement, of the techniques of quantitative analysis, and of the relevance of results, interpretations, and conclusions. Chapter 12 will be devoted, therefore, to the mechanics of writing a research report, and attention will be given to problems relating to footnotes, tables, graphs, bibliographies, and narratives. Some useful style manuals will be recommended, and examples of various methods (formats) of presentation will be provided. Clearly written abstracts of completed studies will also be provided as guides for the student of library science research methods.

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2. Voigt, Melvin J. and White, Carl M., "Research in Librarianship," an unpublished paper prepared for outlining the objectives of the Department of Librarianship, University of California at San Diego, December, 1967.

3. Muller, Robert H., "The Research Mind in Library Education and Practice," Library Journal 92:(March 15, 1967):1126-1129.

4. Eaton, Andrew J., "Research in Librarianship in the U.S.A.," Federal Library Committee Newsletter (Appendix), November 1970.

5. Winger, Howard W., Discussion of Harold Lancour's paper "The Library School and Research in Librarianship in North America," delivered to the Committee on Library Education, Council of the International Federation of Library Associations, 37th Session, Liverpool, England, September 2, 1971.

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8. Stangl, Peter, review of An Introduction to Scientific Research in Librarianship by Herbert Goldhor. Bulletin of the Medical Library Association 58(July,1970):445-446.

9. Childers, Thomas, "Research Primer," review of An Introduction to Scientific Research in Librarianship by Herbert Goldhor. Library Journal 95(April 1, 1970):1298-1299.

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11. Levis, Joel, review of Reader in Research Methods for Librarianship, by Mary Lee Bundy and Paul Wasserman. RQ 10(Fall, 1970):77-78.

12. Waples, Douglas, Investigating Library Problems, University of Chicago Press, Chicago, 1939.

13. Purdy, Flint G., "Investigating Library Problems," review of Investigating Library Problems by Douglas Waples. College and Research Libraries 1(1939-40):141-142.

14. Buckingham, B. R., "A Challenge to Librarians," a review of Investigating Library Problems by Douglas Waples. Journal of Higher Education 11:114, February 1940.

15. Fry, Bernard M., Evaluation Study of ERIC Products and Services. 4 vols. Bloomington, Indiana, 1972. (U.S. Office of Health, Education, and Welfare, Office of Education, National Center for Educational Communication, Project No. BR00375, Grant No. OEC-0-70-3271).

A P P E N D I X

A. OUTLINE OF INDIANA UNIVERSITY GRADUATE LIBRARY SCHOOL COURSE (L593) INTRODUCTION TO RESEARCH IN LIBRARY SCIENCE.

B. SAMPLE FORM FOR OUTLINE OF RESEARCH REPORT.

C. OUTLINE TO BE FOLLOWED IN PREPARING RESEARCH PROPOSALS.

GRADUATE LIBRARY SCHOOL

INDIANA UNIVERSITY

L.S. L593 INTRODUCTION TO RESEARCH IN LIBRARY SCIENCE Mr. Busha

Textbooks:

(1) Goldhor, Herbert, An Introduction to Scientific Research in Librarianship. U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Research, 1968.

(2) Koenker, Robert H., Simplified Statistics for Students in Education and Psychology. Totowa, New Jersey: Littlefield, Adams and Co., 1971.

(3) Turabian, Kate L. A Manual of Term Papers, Theses, and Dissertations. Chicago: University of Chicago Press, 1967..

Supplementary Textbooks: (Not necessary to purchase)

(1) Kerlinger, Fred N., Foundations of Behavioral Research. New York: Holt Rinehart and Winston, Inc., 1965. (Call number: BF 76.5.K38)

(2) Sellitz, Claire. Research Methods in Social Relations, by Claire Sellitz, Marie Jahoda, Morton Deutsch, and Stuart W. Cook. New York: Holt, Rinehart and Winston, 1967. Revised one-volume edition. (Call number: H62.R42)

Readings:

In addition to reading of the required textbooks, parallel readings will be assigned for each topical section of the course. Readings for the course are located primarily in the reserve book collection of the Graduate Library School and in the Graduate Reserve Room of the Indiana University Library.

Written Reports:

Each student will be required to abstract three journal articles about library science or behavioral science research projects during the semester. Written abstracts should be brief. The format of the abstracts is standardized. Abstracts will be turned in according to an announced schedule. Printed forms will be provided by the instructor for this purpose. Announcements of acceptable journals and due dates for written abstracts will be made in class by the instructor. Grades on abstracts count as one third of your final grade.

Examination:

Two exams will be given. The first will be scheduled near the midpoint of the course. A take-home exam, consisting of statistical problems, will also be given during the final week of the course. Together, the two exams will count as one third of your final grade.

Individual Project:

Each student will be expected to submit a typed research proposal near the end of the course. Instructions and due date for this proposal will be given in class by the instructor. The proposal counts one third of your final grade.

Course Objectives:

This course will provide an introduction to the procedures for conducting and reporting research in library science. It will also provide each student with an opportunity to pose a research question, to form an hypothesis, and to outline the methodology for testing the hypothesis in a formal written proposal. Basic statistical procedures will also be covered in the second half of the course in order to provide students with a fundamental knowledge of the technique of statistical analysis.

I. INTRODUCTION TO THE COURSE AND BACKGROUND OF LIBRARY RESEARCH

A. Goals of the course.
B. An overview of the development, scope, and method of research in librarianship.
C. Relationship of research in librarianship to research in the behavioral sciences and pure sciences.

Readings:

(1) Berelson, Bernard. The Behavioral Sciences Today. New York: Basic Books, 1964. pp. 1-89. (Call number: H35.B44)

(2) Kaplan, Abraham. The Conduct of Inquiry; Methodology for Behavioral Sciences. San Francisco: Chandler Publishing Co., 1964. pp. 27-32; 78-82; 115-124; 161-169; 206-213; 250-255; 288-291; 322-325; 358-367; 406-411. (Call number: H61.K15)

(3) Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1965. pp. 3-51.

II. THE SCIENTIFIC METHOD AND ITS RESEARCH TERMINOLOGY

A. System and order of the scientific method.
B. Application of the scientific method to research in library science.
C. Essential terms used in relation to research employing the scientific method.

Readings:

(1) Beveridge, William I. B. The Art of Scientific Investigation. New York: W. W. Norton, 1957. (Call number: 0180.A1B5)

(2) Wilson, Edgar Bright, Jr. An Introduction to Scientific Research. New York: McGraw-Hill, 1952. Chapter 3, "Elementary Scientific Method," pp. 21-35. (Call number: 0180.A1W7)

III. LOGICAL DESIGN OF RESEARCH

A. Theory.
B. The hypothesis.
C. Causation and proof.

Readings:

(1) Good, Carter V. Methods of Research: Educational, Psychological Sociological. New York: Appleton-Century-Crofts, 1954. (Call number: AZ105.G64)

(2) Selltiz, et al. Research Methods in Social Relations. Published for the Society for the Psychological Study of Social Issues. New York: Holt, 1967. pp. 26-74 (Chapters 2, 3, and 4, "The Logic of Testing Causal Hypotheses") (Call number: H62.R42)

IV. GENERAL TYPES OF RESEARCH

A. Historical.
B. Descriptive.
C. Experimental.

Readings:

(1) Barzun, J. and Graff, H. The Modern Researcher. New York: Harcourt Brace, 1957. pp. 43-60; 61-175; 229-248. (Call number: D13.B28)

(2) Nevins, Allan. The Gateway to History. New York: Doubleday, 1962. (Call number: D13.N5)

(3) Hockett, Homer O. The Critical Method in Historical Research and Writing. New York: Macmillan, 1958. (Call number: E175.7.H641)

(4) Shera, Jesse H., "On the Value of Library History," Library Quarterly 22(1952): 240-251.

(5) Conant, James B. Science and Common Sense. New Haven: Yale University Press, 1951. (Call number: Z175.C675)

(6) Good, Carter V. and Scates, Douglas E. Methods of Research: Educational, Psychological, Sociological. New York: Appleton-Century-Crofts, Inc., 1954. (Call number: AZ105.G64)

(7) Ray, William S. An Introduction to Experimental Design. New York: The Macmillan Company, 1960. (Call number: 0175.R24)

V. COLLECTION OF DATA IN BEHAVIORAL SCIENCE RESEARCH

A. Survey Research.
   1. Interviewing.
   2. Questionnaires.
   3. Community surveys.
B. Content Analysis.
C. Case Study.
D. Direct Observation and Unobtrusive Measures.
E. Attitude Scales.

Readings:

(1) Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1965. pp. 392-411, 466-477; 581-603. (Call number: BF76.5.K38)

(2) Selltiz, et al. Research Methods in Social Relations. Published for the Society for the Psychological Study of Social Issues. New York: Holt, 1967. pp. 236-268. (Call number: H62.R42)

(3) Backstrom, Charles H. Survey Research, by Charles H. Backstrom and Gerald D. Hursh. Chicago: Northwestern University Press, 1969. (Call number: JA86.B12)

(4) Osgood, Charles E.. The Measurement of Meaning, by Charles E. Osgood George J. Suci, and Percy H. Tanmenbaum. Urbana: University of Illinois Press, 1967. Chapters 1, 2, and pp. 272-274. (Call number: B840.082)

(5) Thurstone, Louis L. The Measurement of Attitude. Chicago: The University of Chicago Press, 1964. (Call number: BV602.T5)

(6) Edwards, Allen L. Techniques of Attitude Scale Construction. New York: Appleton-Century-Crofts, 1957. pp. 19-51; 83-117; 120-147; 149-170; 201-218. (Call number: BF39.E26)

(7) Budd, R. W. and Thorp, R. K. An Introduction to Content Analysis Ames: The University of Iowa School of Journalism, 1963. (Call number: P93.B92)

(8) Mitchell, Robert E., "The Use of Content Analysis for Exploratory Studies," Public Opinion Quarterly 31(Summer, 1963):223-241.

VI. STATISTICAL METHODS FOR RESEARCH IN LIBRARIANSHIP. In a series of in-class and take-home exercises, students will be required to solve a number of statistical problems.

A. Measures of Central Tendency.
B. Measures of Dispersion.
C. Correlation.
D. Standard Deviation.
E. Normal Curve
F. Chi-square

Readings:

(1) Kendall, M. G., "Statistics," International Encyclopedia of the Social Sciences, vol. 15, pp. 206-232. (Call number: H41.163. Located in Reference Room of Main Library)

(2) Read chapters 1-5 and other appropriate sections of Arkin and Colton's Statistical Methods as Applied to Economics, Business, Psychology, Education, and Biology (New York: Barnes & Noble, Inc. (College Outline Series), 1966.

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L.S. L593 INTRODUCTION TO RESEARCH IN LIBRARY SCIENCE Mr. Busha

ABSTRACT OF RESEARCH REPORT

Student's Name: _____ Date: _____

Author's Name: _____

Title of Article or Report: _____

_____

Name of Journal: _____

Vol. no: _____ Date: _____ Pages: _____

I. List hypothesis or hypotheses:

II. What are the independent variables? III. What are the dependent variables?

_____ _____

_____ _____

_____ _____

_____ _____

IV. Would you classify the research as "theoretical/pure" or "applied"? _____

Give reason(s) for your decision:

V. In one-hundred words or less, describe the methodology of the research:

VI. Were data graphically represented in the report in charts, graphs, or other figures and tables? _____ (yes) _____ (no)

VII. Describe graphical presentation of data if the answer to question VI was "yes."

VIII. Were data obtained from a sample which was drawn from a population?

_____ (yes) _____ (no)

IX. If answer to question VIII was "yes," describe how the sample was selected.

X. Data collected in the study could best be described as having been obtained from which of the following methods? (Check appropriate one(s))

_____ Experimentation
_____ Field Methods (interviews or questionnaires)
_____ Case Study
_____ Historical investigation
_____ Content Analysis
_____ Observation (direct or indirect)
_____ Other (list) _____

XI. If statistical analysis was made of collected data, which of the following procedures were used? (check appropriate one(s))

_____ Measures of central tendency (mean, medium, mode, etc.)
_____ Variability (quartile deviation, standard deviation, standard error, etc.)
_____ Analysis of variance
_____ Chi-square or other nonparametric measures
_____ Probability or prediction
_____ Other(s) (please list) _____

_____

XII. What are the theoretical implications of the research? (Describe in one-hundred words or less):

XIII. What are the conclusions of the research? Are conclusions supported by the data collected?

XIV. Does the author make suggestions for further research? _____ _____
(yes) (no)

If the answer is "yes," please list author's suggestions:

XV. What suggestions would you recommend for further research in the area of inquiry with which this research was concerned?

XVI. In one-hundred words or less, write a descriptive abstract of the article or report which you read. (Who, what, when, where, why, and with what ~~froults?)~~ results ?)

XVII. Write a brief critical analysis of the research reported in the article or report which you read. You should also include critical comments here about the article itself.

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OUTLINE TO BE FOLLOWED IN PREPARING RESEARCH PROPOSALS

General Instructions: In writing your proposal, follow the outline provided here. Include all the applicable information recommended and any additional information which you feel is necessary for a clear understanding of your proposal.

I. STATEMENT OF THE CONTEXT OUT OF WHICH THE PROBLEM ARISES

The problem may originate as a practical library problem of interest, as the result of hunches from observations, or as an inference from a theory or a previous research paper.

II. THE SIGNIFICANCE OF THE PROBLEM

What is the scientific significance of the problem? Getting the answer is usually not enough. The fact that the investigator is interested in the problem is usually not enough. Finding the answer to the problem must be important in terms of its repercussions on associated problems or theories.

III. THE PROBLEM NARROWED DOWN AND RESTATED

Most problems turn out to be programs. There is usually not enough time for one person to do a whole program of research. The field must be narrowed down to some starting point that is not too ambitious. State the purpose of the proposed study, and state the hypothesis or hypotheses.

IV. RELATED STUDIES: THE LITERATURE SEARCH AND EXAMINATION

One or more related studies should be cited; it is the investigator's scientific obligation. Follow the practice of using uniform citations in references and in bibliographies. Use a particular style recommended in a standard bibliographic guide. While it is important to discuss related studies in this section of the proposal, do not attempt an elaborate review of the literature.

V. PROCEDURES AND METHODS

Give an exact, detailed description of the methods which you plan to use in collecting your data, i.e., in answering the questions which you have posed. Explain how the hypothesis or hypotheses will be tested. If they are to be tested statistically, list the techniques you will employ. Another investigator who might want to repeat your study should be able to do so after reading your description of the methodology to be employed. Specific areas to be covered in this section are as follows:

(1) Subjects studied (if any); define your population, etc.

(2) Locale of the study: Will it be conducted in the library, among a group of libraries or librarians, in a laboratory, in a factory, in a dorm, etc.?

(3) What are your measuring instruments? Discuss problems of questionnaire design, attitude scales and measurement, if involved, and other methods such as content analysis, pre-testing of instruments, scales, or questionnaires.

(4) Provide operational definitions of concepts in your hypotheses.

(5) Discuss special problems of design (control groups, practice effects on your subjects, sampling methods, etc.)

(6) Discuss how you intend to analyze your data (statistical tests which you anticipate using, if any, and why you plan to use them. Discuss other methods of analysis if you plan to use them.

VI. LIMITATIONS OF THE PROPOSED STUDY

List the limitations of the proposed study. Give reasons for these limitations, and explain how you have attempted to overcome limitations, if applicable. State what the proposed study does not include or does not propose to do, if you think that such questions might arise.

V I T A E

C H A R L E S B U S H A is an assistant professor on the faculty of the Indiana University Graduate Library School, where he teaches Introduction to Research in Library Science and Communication Media and Libraries. A graduate of Furman University with a major in political science and minors in history and journalism, Mr. Busha attended library school at Rutgers, The State University, from which he received the M.L.S. degree, and he received the Ph.D. degree in library science with a minor in mass communications from Indiana University. Formerly, he was employed by the Greenville County (S. C.) Library, and he was also reference consultant of the South Carolina State Library. He is the author of Freedom versus Suppression and Censorship (Libraries Unlimited, 1972) as well as a number of articles in professional journals.

R O Y A L P U R C E L L is a cum laude graduate of Indiana University, from which he also received the M.L.S. degree. He was also graduated from the Fletcher School of Law and Diplomacy at Tufts University. Mr. Purcell has taught social studies in several high schools, including the Oxford School in Miami Beach, Florida and in the Dade County (Florida) Public School System. For a number of years he has been engaged in free-lance writing for magazines and newspapers, and from 1965 to 1970 Mr. Purcell was enrolled in post-graduate studies in the School of Education of Indiana University.